II. Restriction

In the Amendment filed on November 12, 2002, applicants amended independent claims 1, 13 and 17 to incorporate the limitation of original claim 12. Original claim 12 had recited interposing a microelement array between the source of the radiation and the material. At the same time, applicants added claims 18-21 to cover example embodiments of the microelement array recited in the amended claims.

The Examiner concluded in the most recent Office Action that claims 20-21 are directed to an invention that is independent or distinct from the invention originally claimed. In support of withdrawing those claims from consideration, the Examiner stated that "the microelement can be formed as micro-lens array or micro-prism array; however, this microelement is formed as hologram element or an array of light switches is entirely different subjects, that would be related to distinct inventions since the functions and properties of as hologram element or an array of light switches are different from the microelement 4 as shown in Fig. 1."

Applicants do not agree that claims 20-21 should be withdrawn from consideration. As explained in MPEP § 803.01, a requirement for restriction between inventions requires (A) that the inventions be independent or distinct and (B) that there be a serious burden on the examiner. The Examiner has not shown either of these elements in this new restriction requirement.

The Examiner stated that the functions and properties of hologram elements and an array of light switches are different from the microelement (4) illustrated in Figure 1. Applicants are confused by these remarks. As explicitly recited in the claims themselves, the function of the "microelement array" is "to generate locally different oblique radiation" from the source of radiation to the material. The microelement array performs this function regardless of whether it is a microlens array, a microprism array, a hologram element, an array of light switches, or any other kind of "microelement array." Applicants do not understand why the Examiner believes that there are different "functions" of the claimed embodiments of the microelement array, what those different functions are, or how they would relate to any proper restriction of the claimed invention.

Applicants also do not understand why the Examiner relies on the microelement array illustrated in Figure 1 to support the restriction. Figure 1 was drafted and submitted in response to the Office Action of July 19, 2002, on explicit request from the Examiner after the invention had already been examined. The Figure illustrates one embodiment of a microelement array, and the Brief Description of the Drawing refers to that specific element only as an "example." The full scope of original claim 12, unrestricted by the specific type of microelement array, had already been examined as evidenced by the Examiner's rejection of that claim in the earlier Office Action. It seems improper for the Examiner to use the newly added Figure as "evidence" that certain microelement arrays not illustrated by the Figure somehow constitute non-elected subject matter that was not included in the originally-presented invention. The embodiments of claims 20-21 were just as much part of the originally-presented invention as the embodiments of claims 18-19. Applicants could have easily introduced additional Figures illustrating the embodiments of claims 20 and 21. Applicants see no legal rationale for having the restriction turn on which embodiment happens to be exemplified in a Figure submitted after the full scope of the invention has already been examined.

Applicants therefore respectfully request that claims 1-10 and 13-21 be examined together in this application.

III. Rejection of claims under 35 U.S.C. § 103(a)

The Examiner rejected claims 1, 3-9, 13-15 and 17-19 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 5,912,717 to Sugiyama et al. ("Sugiyama") in view of U.S. Patent No. 5,629,056 to Koike et al. ("Koike").

In support of the rejection, the Examiner stated that Sugiyama teaches the making of a wall of a liquid crystal cell, comprising exposing material of the cell to unpolarized natural light from an oblique direction, where the resulting cell imparts a tilt and azimuthal alignment to liquid crystal molecules. The Examiner acknowledged that Sugiyama does not disclose interposing, between the radiation source and material, a microelement array for transmitting light in an orthogonal direction. The Examiner characterized Koike as teaching a method of making a wall that involves interposing

such a microelement array between the source of radiation and material. The Examiner concluded that it would have been obvious to modify the method of Sugiyama by interposing a microelement array of Koike between the source of radiation and the material for transmitting light in an orthogonal direction.

Claims 1, 13 and 17 have been amended to recite that the radiation to which the material on the liquid crystal cell wall is exposed is zonewise patterned in one irradiation step. Interposing the microelement array between the source of radiation and the material generates locally different oblique radiation in that irradiation step.

Liquid crystals can be oriented by materials irradiated from an oblique direction. By changing the direction of irradiation of a material, one can change the angle of tilt and alignment that the material would impart to liquid crystals. It can be desirable to make a material that imparts different orientations at different locations of the material. To do that, one needs a way to change the direction of irradiation locally across the material. The claimed inventions recite the use of a microelement array to accomplish that. The claimed inventions also allow for the irradiation of different directions in different zones using one convenient irradiation step.

The Examiner interpreted Sugiyama as lacking a teaching of a microelement array interposed between the source of radiation and the material for transmitting light in an orthogonal direction. Applicants agree. Perhaps more relevant to the claimed invention, however, is that Sugiyama does not suggest a microelement array interposed between the source of radiation and the material for transmitting light in an oblique direction. The claimed inventions recite exposing the material to radiation from an oblique direction, and the microelement array between the source of the radiation and the material generates locally different oblique radiation. The following excerpt from the specification discusses this feature of the invention:

> As for the radiation to which the material is exposed, this may be zonewise patterned, for example by interposing a microelement array, such as a microlens or microprism array or a suitable hologram element, between the source of the radiation and the material, so that, in said imparted property, the preferred alignment is zonewise patterned. Using such a microelement array further allows to generate locally different oblique radiation from a single radiation source even if the source itself radiates perpendicular to the material layer or the microelement array.

Specification at page 2, lines 21-27. The specification at page 3, lines 28-30, also discusses the convenience of using "microlens-, microprism- or similar arrays for the illumination, leading to a structured alignment with only one irradiation step, not possible with polarised light."

The two passages quoted above explain that orientation is generated through irradiation from an oblique direction. To zonewise pattern a material in one irradiation step, the claimed invention recites using a microelement array for patterning the layer. This microelement array can zonewise change the direction of the light impinging onto the microelement array and generates locally different oblique irradiation onto the layer to be structured. The microelement array is therefore by no means used for transmitting light in orthogonal direction. Furthermore, if the microelement array were to transmit light in orthogonal direction, the orientation would not be generated. The Examiner's proposed combination of documents to interpose a microelement array between the source of radiation and material, for the transmission of light in an orthogonal direction, simply does not suggest the claimed invention.

Sugiyama itself fails to suggest the claimed invention for a number of other reasons. Sugiyama discloses zonewise patterned layers in the context of Figure 3, and in the discussion at column 7, line 50 to column 8, line 10. That disclosure relates to the use of multiple masks to produce, for example, a "checkerboard" pattern of regions having different orientation directions on a layer. The use of the two different masks having complementary patterns results in irradiation through two different steps using two different masks and two different directions of irradiation. The discussion does not suggest a microelement array able to locally generate different angles of irradiation onto a layer and does not suggest the possibility of using just one irradiation step to generate multiple patterns of different orientation.

Koike, the second document cited by the Examiner, does not combine with Sugiyama to suggest the claimed invention. First of all, Koike relates to a quite different field of liquid crystal cell technology. The patent discloses the production of liquid crystal cells involving the mechanical step of rubbing to generate orientation. In contrast, the Sugiyama disclosure uses only optical means (irradiation) for generating

orientation. Applicants therefore seriously question why one skilled in the art would have looked to the Koike disclosure for guidance on how to modify the solely optical orientation techniques of Sugiyama.

Even if Koike could have been combined with the Sugiyama disclosure, this combination still would not have suggested the claimed invention. As stated by the Examiner, Koike discloses a method of making a wall of a liquid crystal cell, wherein in one step (at least one other step being a mechanical step of rubbing), between the source of the radiation and the material, there is interposed an element for transmitting light in a certain direction (see column 17, lines 9-57, in conjunction with Figure 21). Figure 21 cited by the Examiner discloses a device (60) that is a conventional mask commonly used in irradiation techniques. Such a mask is used, for example, to cover certain areas to protect them from irradiated light being applied to other areas of the same layer. In this respect, this mask (60) is not much different from other masks disclosed in this document, for example, as disclosed in Figure 20. The mask according to Figure 21 contains a material (such as quartz) that is transparent for UV irradiation. See reference numeral (60a). The mask (60) comprises protruding portions (60c) coated with a material (60b). Material (60b) blocks UV irradiation and is therefore not transparent for light in that spectral range. The areas between the protruding portions comprise an air gap between the layer and mask, and this is stated to lead to an increased efficiency of the irradiated light in these areas. The remaining areas coated with the material 60b are as close as possible to the layer to be modified, and thus efficiently protect certain areas of the layer from irradiation, even irradiation from an oblique direction.

The mask (60) from Koike is not disclosed as a microelement array as used in the claimed invention, since this mask is not disclosed as being able to locally change the direction of irradiation impinging onto the layer. Instead, the mask simply covers certain areas to protect them from irradiated light being applied to other areas. Additionally, Koike does not suggest the possibility of inducing different domains by different oblique radiation through use of one single irradiation step. To the contrary, the mask (60) is designed to avoid locally different oblique irradiation in any single

irradiation step. One skilled in the art therefore would not have been motivated to consult Koike for combination with Sugiyama and would not have reached the claimed invention even if the two could have been combined.

Lastly, the Examiner cited U.S. Patent Nos. 5,929,201 and 6,001,277 and GB 2319093 in support of the rejection of claims 2, 10, and 16 when used in combination with Sugiyama and Koike. U.S. Patent Nos. 5,929,201 and 6,001,277 and GB 2319093 were cited only for teachings of certain embodiments of the inventions in the dependent claims, such as the irradiation energy, crosslinking of the material, and properties of liquid crystals. Those teachings do not fill the gaps missing in Sugiyama and Koike to suggest the inventions of independent claims 1, 13 or 17. Claims 2, 10 and 16, which incorporate the limitations of the independent claims, should therefore be patentable for all the reasons mentioned in the earlier remarks.

In view of the amendments and remarks above, the pending claims should be examined together in this application and should be in condition for allowance. If there is any fee due in connection with the filing of this Amendment, please charge the fee to our Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
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By: _____
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Date: July 11, 2003

Appendix Detailing Amendments to Claims

1. (Twice Amended) A method of making a wall of a liquid crystal cell, comprising imparting a property to a layer of a material on the wall, said property being that liquid crystal molecules placed on the material on the wall in use of the cell adopt a preferred alignment,

the method comprising exposing the material to unpolarised or circularly polarized radiation from an oblique direction,

wherein the said property further includes imparting a preferred tilt as well as a preferred azimuthal alignment to such liquid crystal molecules,

wherein the radiation to which the material is exposed is zonewise patterned in one irradiation step by interposing a microelement array between the source of the radiation and the material to generate locally different oblique radiation, and such liquid crystal molecules are zonewise aligned.

13. (Three Times Amended) A liquid crystal cell wall bearing a layer of material, wherein the material has been exposed to unpolarised or circularly polarised radiation from an oblique direction, wherein the radiation to which the material was exposed was zonewise patterned in one irradiation step by interposing a microelement array between the source of the radiation and the material to generate locally different oblique radiation, and wherein the material can impart an alignment to liquid crystal molecules if placed on the material, wherein liquid crystal molecules placed on the material would be zonewise aligned.

17. (Twice Amended) A method of making a wall of a liquid crystal cell, comprising exposing a layer of a material on the wall to unpolarised or circularly polarised radiation from an oblique direction, wherein the material can impart a tilt and an azimuthal alignment to liquid crystal molecules if placed on the material,

wherein the radiation to which the material is exposed is zonewise patterned in one irradiation step by interposing a microelement array between the source of the

radiation and the material to generate locally different oblique radiation, and liquid crystal molecules placed on the material would be zonewise aligned.